



POLYMER80

Phoenix Version – G150 80% Lower Receiver Instructions

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Questions, feel free to email us at our support email address or call:

800-517-1243

support@polymer80.com

The Phoenix version does not have a red core

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Up-to-date Developments and Notes:

- Wood screws to hold the jig together are no longer needed.
- The stainless steel pin and small black set screw are used for the bolt catch latch installation.
- When installing the bolt catch buffer, make sure you put the spring on the buffer first...there's no easy way to remove the detent if you forget to put the spring on first!! If someone figures it out call me and I'll put it in the Tips and Tricks section – Dave, (707)-688-3631/
- See the last section for Tips and Tricks for assembly.

Warnings!! – Issues that impact warranty coverage!!

Polymer80, Inc. stands by our product and offers an excellent no-hassle warranty coverage. But, there are limits to coverage, particularly when the customer damages the product through poor craftsmanship or control during the milling process. Additionally, after the milling is completed, the build process seems to be where most people get into trouble, particularly during assembly and cleaning. Here are key areas that you need to watch for:

1. Do not tap a roll pin in the bolt catch latch hole, **USE OUR STAINLESS DOWEL PIN AND SET SCREW ONLY.**
2. Do not use any lock-tight on the receiver – regardless of what some internet assembly instructions tell you.
3. Chemicals: Generally, you do not need to lubricate polymer products.
 - a. Many oils are combined with rust penetrants which can damage polymer based products.
 - b. Do not utilize brake cleaner (it has Acetone in it) or rust penetrants, they penetrate through polymer, similar to how they penetrate into metal.
 - c. **Do not put Acetone on the receiver.** Acetone will generally instantly destroy, tarnish, or weaken any polymer-based product.

Parts List

Part Description	ITEM	Qty per Lower
AR15 Lower Receiver	G150	1
Set Screw Bolt Catch Pin	3mm	1
Dowel Pin for Bolt Catch	5/8in	1
Pistol Grip Nut	3/8in	1
Pistol Grip Screw	1.5in	1
Allen Wrench (Hex Wrench)	1/16th	1
Jig Parts List	ITEM	Qty per Jig
AR15 Jig	J100	1
End Mill with beveled stop marker	9mm end mill	1
Drill Bit, Safety Selector Switch Hole	3/8" drill bit	1
Drill Bit, Pin Holes for trigger and hammer	5/32" drill bit	1
Drill bit for trigger hole	5/16" drill bit	1



Methods to Finish the Lower Receiver:

The goal of finishing the lower receiver is to mill out the fire control pocket area utilizing the jig as your guide. These instructions will guide you through the process of removing this material. There are different techniques utilized, in general I'm going to cover utilizing a Drill Press. I will not go into much detail for those who have Milling Machines, the assumption is a user at this level would already have a strong sense of what to do.

Regardless, I've provided exact measurements for all techniques, because even a person using the milling machine will need the depths which would allow them to properly configure the machine.

Different techniques will result in different qualities of finish. Utilize this grid based on desired end-results and your access to tools. In all cases, use the jig and drill bits and always level the jig in your vise:

Type of Finish	Tools Required
Excellent (recommended)	Drill Press with vise, bench vise and basic tools like a Dremel tool and hand drill
Highest Quality (recommended)	Milling Machine, plus a hand held drill and bench vise for the pin holes.

I prefer to utilize the drill press because it is faster, requires less time to set up, and you have absolute control if the vise when utilized properly. Additionally, you use the Drill Stop that comes on most drill presses to control the depth of the plunging motion. Use a dremel tool to do fine tuning after utilizing the Drill Press or Milling Machine. The challenge with the dremel is to shave off small amounts, don't get in a hurry. Use a cutter such as the 9904 tip, link provided below. Do not attempt to utilize a dremel tool to mill out the system because the jig is what defines the angles, widths and depths to finish the product properly.

[http://www.dremel.com/en-us/Accessories/Pages/ProductDetail.aspx?pid=9904.](http://www.dremel.com/en-us/Accessories/Pages/ProductDetail.aspx?pid=9904)



Example Tools and Usage Notes

For these projects, extremely expensive or high-end tools are not required. All of these tools can be utilized for each Polymer80 receiver project that you will finish, including .308 Lower Receivers and Pistol Frames, so it's easy to justify the expense! (wink)

Example Tools	Web Link	Notes
Vise For Drill Press	http://www.northerntool.com/shop/tools/category_hand-tools+vises-clamps+drill-press-vises	Best to find a vise that has 6" inch jaws, it gets a wider grip on the jig, and reduces vibration.
Drill Press	http://www.harborfreight.com/catalogsearch/result?q=drill+press	RPMs for Drill Press should be set to 1850 to approx 2250
Digital Calipers	http://www.harborfreight.com/6-in-digital-caliper-with-sae-and-metric-fractional-readings-68304.html or MSC Industrial: Ironton 6" Calipers are perfect: http://www.northerntool.com/shop/tools/product_200629284_200629284	Find the calipers that convert ALL THREE conventions: Metric, Decimal and Fractions. Most calipers only do 2, mm and decimal. It's a pain to convert to Fractions then, but you need to. Let the calipers do the work for you.
Dremel Bit #9904	http://www.dremel.com/en-us/Accessories/Pages/ProductDetail.aspx?pid=9904	Use for minor clean up, be careful...these things chew up Glass Filled Nylon real quick. Remember, Dremels = WLDF, whole lotta damage fast!
Level	http://www.northerntool.com/shop/tools/product_200309003_200309003	Utilize small level to ensure you are drilling straight down and level
Round machinists file	http://www.harborfreight.com/12-in-file-set-5-pc-60368.html	Look for the round machinist files, diameter .303 for fine tuning safety and takedown pin holes if necessary. Zoro Tools or Harbor Freight will have inexpensive sets or single units available for under \$7.
Non-marring vice jaws	http://www.homedepot.com/p/BESSEY-Non-Marring-Vise-Jaw-Accessory-for-Use-on-Vises-with-Jaws-from-3-in-to-6-in-Wide-BV-NVJ/204986223?MERCH=REC_-PIPHorizontal1_rr_-207008054_-204986223_-N	Bessey brand has magnets so they stick really well to the vice jaws, but you can use these to prevent getting the vice jaws from marring your gun parts. Home Depot:
Lower Receiver Vice Block	Search for these on our website	
Upper Receiver Vice Block	Search for these on our website.	



Jig Hole Descriptions & Purpose

Jig Hole	Function	Depth from top of Jig to floor of Fire Control Pocket	Depth from top of Receiver to floor of Fire Control Pocket
Hole #1	Mills out the upper platform section that divides the fire control pocket from the rear take down pin area.	45mm to 45.5mm	(use the floor of the rear take down pin area as the guide)
Hole #2	This hole opens up a pocket for the rear side of the trigger mechanism. Ignore this hole, go back only as far as you need to on Hole#1, and leave a 2 to 3mm wall between Hole #1 and the Rear Take Down Pin pocket.	45mm to 45.5mm	1.25in exact
Fire Control Pocket	The fire control pocket is the larger area to be milled out.	45mm to 45.5mm	1.25in exact
Trigger Hole	Drilling this hole opens up the trigger hole. This is one of the first steps using the 5/16ths drill bit.	Drilled through holes	Drilled through holes

Note how the jig with the End Mill bit set at 44.5mm creates a consistent drilling depth. Just move the drill press table up or down to position properly as you move from holes 1&2 to the Fire Control Pocket.

Many hardware stores have fairly inexpensive drill presses (Lowes, Home Depot, Harbor Freight, Granger, etc.).



Getting Familiar with the Jig and Lower Receiver

The goal of finishing the lower receiver is to mill out the fire control pocket of the receiver to the proper depth, and to utilize the jig to get correct placement on the side holes (trigger, hammer and safety holes). The solid core fills the entire fire control pocket.

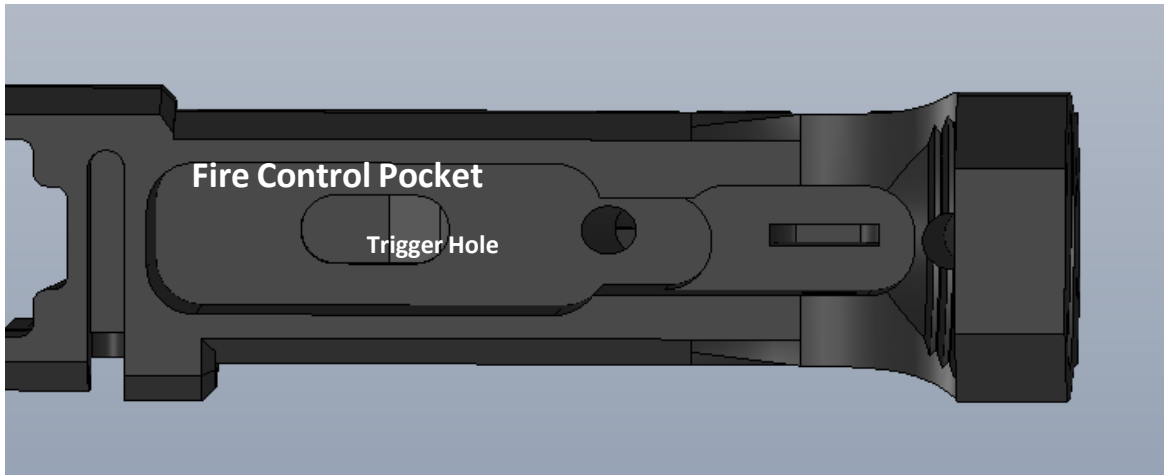
It's important to note the features of the jig and the lower before you start working on the unit.



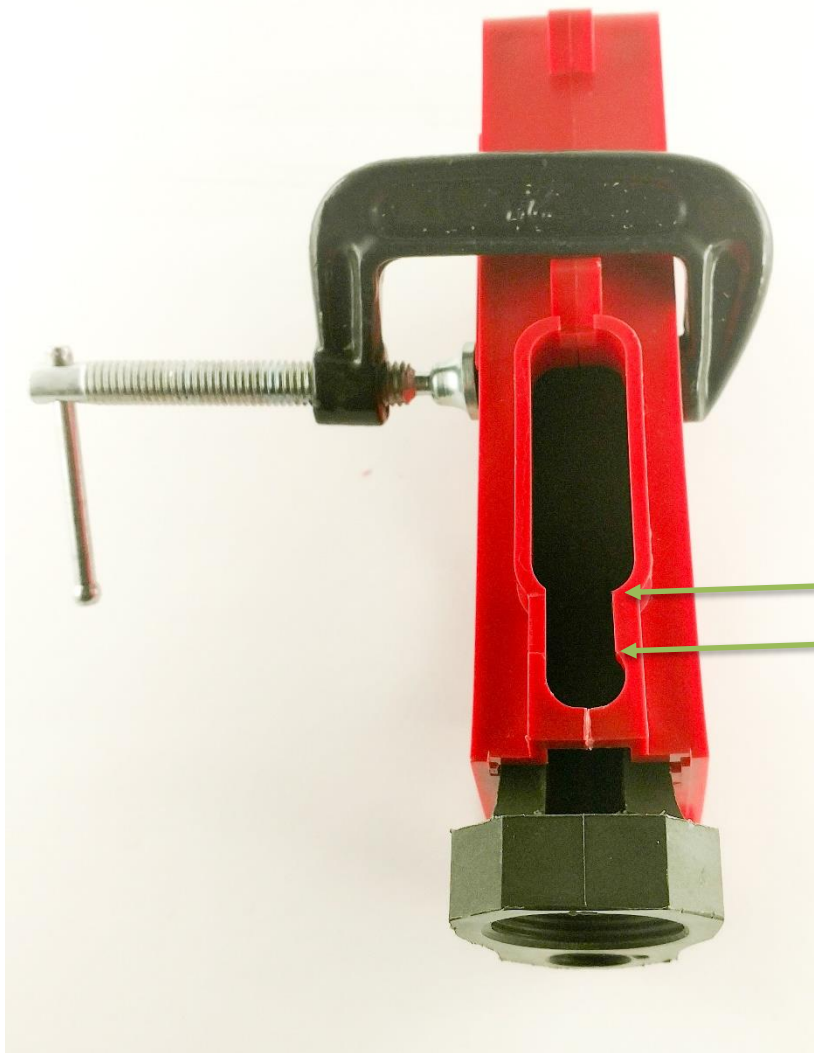
Side View of the Polymer80, 80% Lower Receiver



Top View with Lower Receiver inserted into Jig



IMPORTANT

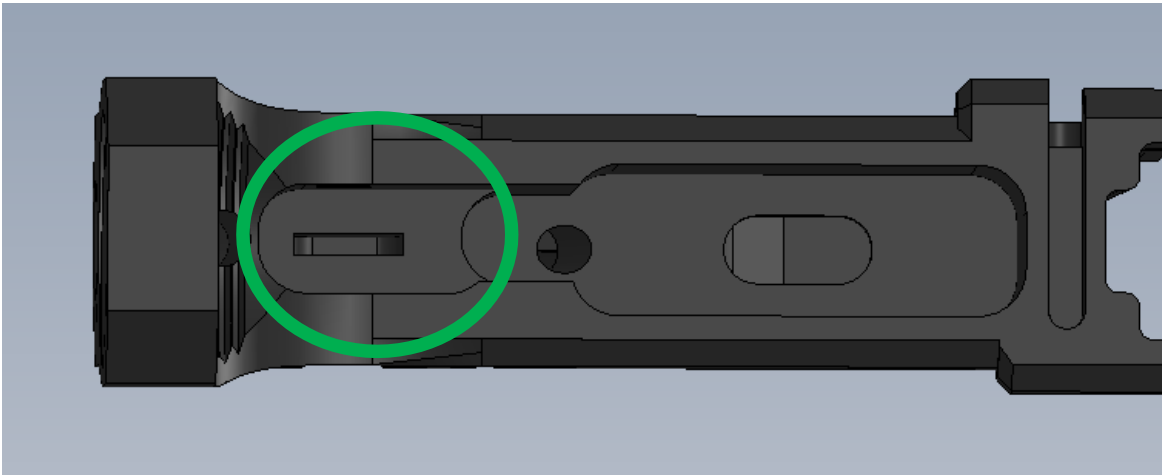


Note how the area of the jig that is **off-centered slightly (where the green arrows are pointing)**. Below this area is where the safety selector detent and spring hole come in from underneath the receiver where the pistol grip is attached. This area is extremely close to the edge where you will be milling.

Do not put drill press or end mill pressure against this side of the jig in this area.

Use a C-Clamp to keep things tight across the top to prevent over extending. If you expose the safety detent & spring hole, the lower receiver will not operate properly. Be conservative while milling around this area!!

Looking Down into an example FINISHED Fire Control Pocket

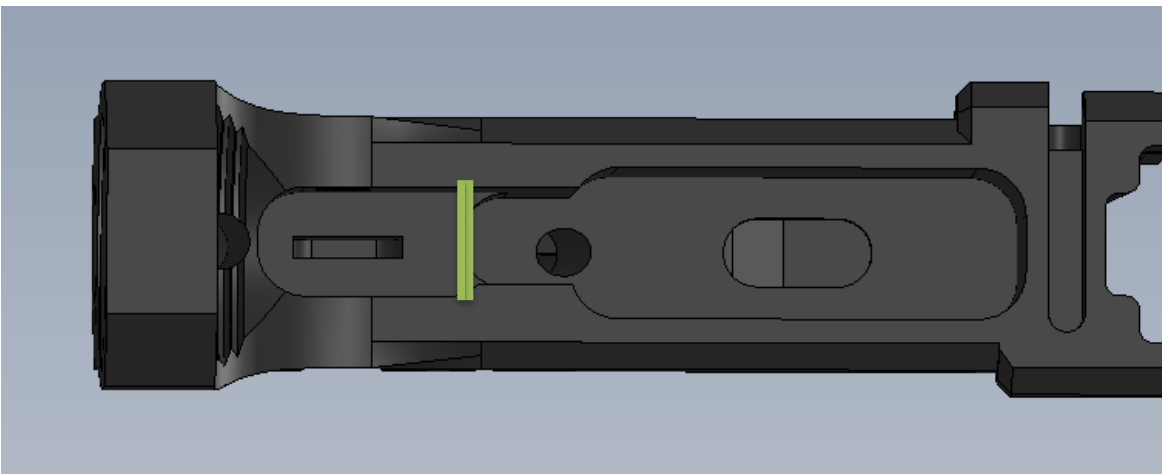


This area near the rear of the Fire Control Pocket is higher or stepped up (for the Rear Take Down Pin Boss that's on the Upper Receiver) compared to the deeper pocket. If you have a finished lower receiver from a previous gun, it might be helpful to compare. You don't need to mill the stepped up area at all, it's completed for you on the Polymer80, 80% Lower.

TIP:

Optional: YOU MAY LEAVE A SMALL 2 TO 3MM WALL BETWEEN THE FIRE CONTROL POCKET AND THE STEPPED UP ARE OF THE TAKE DOWN PIN AREA.

The green area below indicates where you can leave a few mm or more of material. Take a black sharpie and mark the top of the JIG to indicate where to stop milling (You can do this now prior to proceeding if you choose this option)



Preparation (Assumes you are using a Drill Press)

1. Prep the drill press. When using a drill press, the spinning head of the drill press needs to be firmly attached by slamming it with a mallet up into the press, or the vibration of the below procedure can sometimes make the entire head fall out (spinning and ruining things in the process). Take any drill bits out, get a mallet and hit upwards to securely implant the head.
2. Level: Must have a level to create a level interior fire control pocket
3. The end mill slide vise on the drill press (a link is provided above) is the absolute fastest and most secure way to finish this part. Using a tool like this as opposed to just using a dremel tool, you're going to be done much sooner with outstanding results. We utilize the slide vise in various ways around the shop, it's great tool that can be mounted on the drill press table directly, or on your bench underneath a smaller bench drill press and utilized for many other projects.
4. Final Mental Prep: Building a firearm takes craftsmanship and pride, **so don't be in a hurry!** Slow down and work precisely and methodically **Measuring Twice and Cutting Once!!** After you drill something out, you can't put it back, so approach things conservatively. In my personal experience, if I'm feeling like I have no patience, I just stop. I'll put the tools down and walk away from the bench and go take care of whatever made me be in a hurry in the first place. Sounds sort of simple, but I've destroyed too many things in the past from my lack of patience, and if you do it on this part it's going to cost much more time and money (and yes, I have ruined some lowers).

Again, YOU NEED TO SET THE DRILL PRESS DEPTH PROPERLY. The end mill bit is marked at 44.5mm with a black line. Don't rely on the drill press depth stop 100%, utilize the drill stop while also watching the black line on the end mill bit to make sure you don't go too deep. "Measure twice, cut once!" In other words, keep checking the depth at every drill point.

Procedure:

1. Put the Lower Receiver in the Jig and snap them together. Set the small red trigger guide aside for the moment.
2. The first step is to drill the side pin holes (Hammer, Trigger and Safety Selector Switch Hole) using the lower receiver in the Jig. Drill a ¼ inch into each side, BUT NOT ALL THE WAY THROUGH.
 - Put the jig & lower in a regular vise on your bench, select the proper bits provided and **drill on one side only**, then flip the jig and drill the holes on the opposite side.
 - **DON'T try to drill through both sides at one time, GUARANTEED THE BIT WILL DRIFT AND MISS THE TARGET ON THE OTHER END!!**
 - These holes have to be exact. Start the drill full speed with the proper drill bit sizes designated on the side of the Jig, push it into the hole steady and level, drill into the black material only a 1/4" to get the hole through the side wall. Later, once you finish the interior pocket mill-out, the holes will have already been completed.
3. (This step can be skipped and moved to the last step) Next, using a strong tape, tape the small red Trigger Hole Guide into its slot so it doesn't move while you drill the trigger hole out.
 - Go to the drill press, level the jig on the drill press in a vise (preferably the cross slide vise recommended at the beginning of this document). Each time you take the jig out, you check for level when putting it back into the vise. *I prefer to level the table itself on our drill press rather than trying to level the jig in the vise.*
 - Once the trigger guide is snapped in and securely taped, use the 5/16ths drill bit to trigger hole out.
 - Drill down slowly letting the drill bit do the work.
 - Don't allow the drill bit to float side-ways out of alignment of the final pass-through point under the receiver.
 - Drill all the way through the Lower Receiver (don't drill the trigger guard!!). The drill bit shouldn't reach that far. These two holes represent the furthest ends of where your trigger goes, you can finish the middle section later after you've milled out the core fire control pocket.
4. Take the trigger guide off.
5. **Drilling the Fire Control Pocket:** Insert the End Mill Bit on the drill press, adjust TABLE of the drill press so that the tip of the bit is exactly even with the top of the jig at hole one (bend down and look closely, sometimes as you tighten the drill press table, it drifts up). The table that the vise is on or attached to must also be tightened (example: The tables for the floor drill press must be tightened on the back tightening knob or they can move).
Crank it down hard!!
 - Adjust the drill press stop to 44.5mm. Notice that the end mill bit also has a black mark that indicates 44.5mm depth
 - **Drill down into the fire control pocket using the pre-drilled trigger holes as PILOT HOLES.** Go exactly 44.5mm down watching the top of the jig and end mill bit, don't allow the black line on the end mill bit to go below the top of the jig. During each and every drill procedure visually checking to make sure the bit is not sliding up or down within the drill press chuck. Again, the bit starting position is dead even with the top of the jig, as you plunge watch the black line on the bit, not allowing it to go deeper than the top of the jig.
 - If you have a vise that allows X and Y axis movement, (like a **drill press slide vise** pictured in the link above) take advantage of the End Mill Bit and clean out the pocket floor and sides slowly moving along the edge to create a smooth side wall on both sides.
 - Use **drilling procedures** to clear out the majority of the core section by plunging and lifting the



press head up, move to the next section, and plunge down again until you clear out the majority of the interior section. Once this is complete we'll switch to using a **milling procedure** (leave the head down in the pocket and move the jig/lower in the vise to smooth the edges and floor if you are using a cross slide vise).

-
- 6. **Drilling out Hole #1:** Before we get started on this area, **there's one important feature that you must pay attention to.** There's a slight but **IMPORTANT** indentation that you can't drill through because the safety selector DETENT hole is drilled through this area underneath the lower (near where the pistol grip goes).

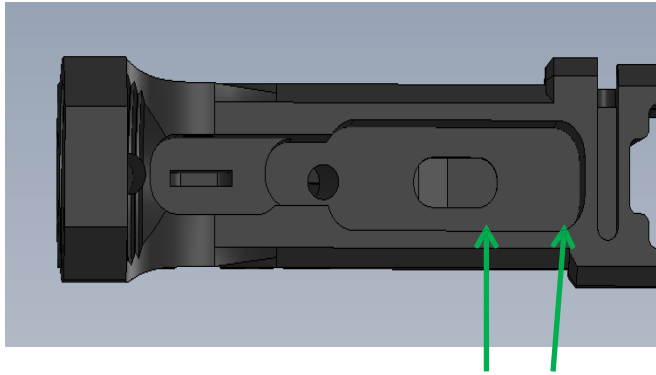


Figure 2, NOTE THE SLIGHT INDENTATION, DON'T DRILL THIS OFF

- If the red jig section in Figure 1 gets in the way or comes into contact with the Chuck, cut that away with the end mill bit. **Cut away the section pictured in Figure 1. Don't penetrate the Lower Receiver or touch the top of the receiver, just cut the upper section of the jig to gain access to hole #1 if necessary. I usually just leave the unit in the vise and slowly drill it off with the drill press.**
- 7. Once the fire control pocket and hole #1 are done you can start going straight across into the wider fire control pocket area to clear smooth out the floor and side walls to refine or smooth them out. It's important to start clearing out the hole from debris so you can see what you are doing. A strong light and a shop vac are useful. Figure 3 shows you the technique and pattern you should follow while plunging and milling.

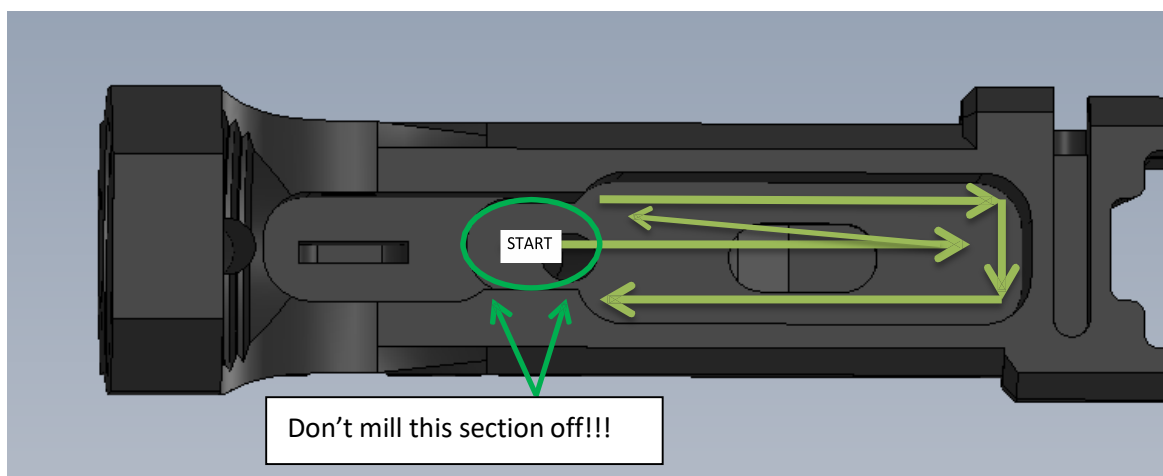


Figure 3

- 8. Note: Now that we're going to start drilling and cleaning out the main fire control pocket using a milling procedure, it's important to note that the drill bit in a drill press is spinning in a clock-wise direction towards

you, from right to left. **ASSUMING YOU ARE USING A CROSS SLIDE VISE** therefore, when moving the jig underneath in the slide vise, follow the path pictured in Figure 3 to prevent the bit from jumping and chattering. You will work against the grain in one sense, rather than allowing the bit to grab and run.

9. Start at the rear side in the pocket where the safety selector switch goes through. Move straight down the middle, then go back and start on the right side, swinging down, around the edge, and then back towards the rear of the fire control pocket.
10. **Each time you go through this process, FOLLOW THE PATH IN FIGURE 3.**
11. If you skipped drilling the trigger hole, now is the time to use the trigger guide and drill the hole for your trigger. See step #4
 - Clean out the trigger hole with a small dremel. I've used a cutting bit such as the #9904 at the LOWEST SPEED to clean up areas like the trigger hole and the side walls as I fit the trigger assembly in place. 9904 bit hyperlink: <http://www.dremel.com/en-us/Accessories/Pages/ProductDetail.aspx?pid=9904>
12. Final step is to start the trigger fitting: In **Figure 4**, there are 3 general areas that you'll focus on (besides the trigger hole itself). The trigger should just drop straight down in there cleanly, but it's never happened to me without some additional fine tuning. **Using the dremel bit on the slowest setting**, I carefully and slowly trim surfaces to make sure the trigger operates smoothly. The rear section on the left side of the below figure is where you need to be careful not to penetrate too far on the wall because the safety selector switch **detent and spring** are very close to this area, and the Milspec leaves very little room for error.

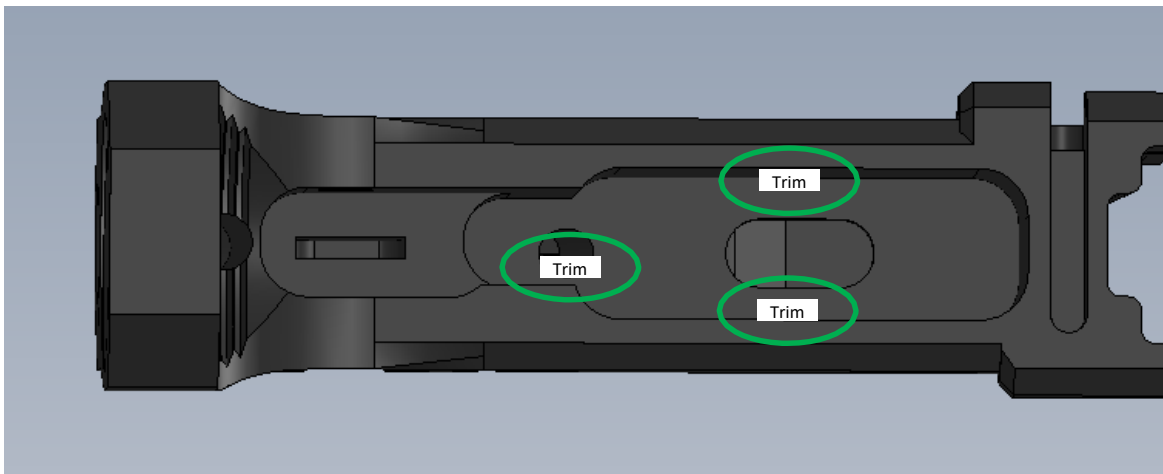


Figure 4

Tips & Tricks to Help in Final Assembly and Testing

1. The depth of the fire control pocket should be 1.25 inches from top of receiver...precise.
2. If you have a ton of trouble getting the trigger in because the pin holes aren't aligning, you might consider several inspections, modifications, or troubleshooting in the following order:
 1. 90% of the issues on trigger assembly are related to the floor of the fire control pocket not being milled deep enough, and therefore the trigger has no room to move even though it might install. The depth of the fire control pocket should be 1.25 inches from top of receiver...precise.
 2. Make sure the trigger hole is vacated of any material that prevents proper movement.
 3. Make sure the rear of the trigger is not rubbing against that odd offset wall (in the rear right) that houses the safety selector switch detent.
 4. Taking a very slight amount more off of the floor of the fire control pocket with the end mill bit (go back to the vise and drill press) and just take several hundredths of an inch off then goback to the trigger fitting to see if that helps.
3. After you install the trigger and hammer, the trigger should release the hammer properly and cleanly of course.
4. At the front side of the fire control pocket, there's very little room in the original milspec design between what I term the firewall and the mag release button housing. If you see exposure to that area after you drill, don't be alarmed, there's almost no material there by milspec design, but this will not impact performance of the firearm.
5. The buffer tube housing has been designed to be snug so no movement is allowed. For those extra tight fits, Teflon wrap rather than oil makes the buffer tube go in easier.
6. **Finally, the other parts included with our kit are described in the chart at the beginning of this document.**
 1. The parts will help you install the pistol grip and the Bolt Catch (the stainless steel dowel pin and small set screw to hold the dowel pin in place.
 2. **Do not attempt to tap a regular roll pin in the bolt catch dowel pin hole.** The dowel pin and set screw are designed to allow you to change out your bolt catch in the future should you choose.

Any further questions, feel free to email us at our support email address or call:

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